

TYPE: 1½ miles east of Refugio, Refugio County, Texas, Fred B. Jones 4353, Oct. 26, 1960, Welder Wildlife Foundation Herbarium (isotypes to be distributed).

The usual habitat of *Z. refugiensis* is an open swale, either in a brushy pasture or on prairie. The soil preference appears to be a tight sandy loam. Flowering occurs five to ten days after a heavy shower, at which time water to a depth of several inches is likely to be standing over the bulbs. A flush of bloom follows each substantial rain from July to November. Other rain lilies which may be present in the swales and come into flower at the same time as *Z. refugiensis* are *Z. pulchella*, *Cooperia Drummondii*, *C. Jonesii*, *C. Traubii* and *Habranthus texanus*.

*Z. refugiensis* is readily distinguished from *Z. pulchella*, to which it seems to have a close affinity, by the longer perianth tube. The lighter yellow perianth and decided fragrance are also distinctive characteristics. Flagg (Fig. 1) reports that the plant differs cytologically from *Z. pulchella*.

As presently known, the species is limited to northern and eastern Refugio County and a small adjoining area in Goliad County.<sup>1</sup> — WELDER WILDLIFE FOUNDATION, SINTON, TEXAS.

## MERGER OF THE NORTH AMERICAN HOUSTONIA AND OLDENLANDIA UNDER HEDYOTIS\*

WALTER H. LEWIS

Principally on the basis of seed, and to a lesser extent floral and fruit characteristics, the genera *Houstonia* L. and *Oldenlandia* L. are distinguished. A comparative study of these features for the North American species and, where possible, for the African *Oldenlandia* is presented using the following outline.

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Dr. Hanna Croasdale kindly prepared the Latin diagnosis.

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Subg. HOUSTONIA<sup>2</sup> — *seeds* few, large, dorsiventrally flattened, crater-form to concavo-convex, with or occasionally without hilar ridge, endosperm corneous; *capsules* one-fourth to three-fourths inferior; *flowers* often dimorphic, corolla elongate.

Subg. OLDENLANDIA — *seeds* numerous, minute, angled, rarely subglobose, endosperm fleshy; *capsules* wholly inferior; *flowers* usually monomorphic, corolla short.

These criteria are largely from the keys and descriptions of Gray (1860), Wernham (1916), Standley (1918), and Fernald (1950).

SEED. A majority of the subg. *Houstonia* species have averages of 10-15 seeds per capsule. However, Rose (1890) reported ca. 40 seeds for *H. brevipes* (Rose) W. H. Lewis, Terrell (1959) recorded up to 35 seeds in the *H. purpurea* (L.) T. & G. complex, and to these are added averages of 30 seeds for the capsules of *H. arenaria* (Rose) W. H. Lewis and 50-60 for those of *H. asperuloides* Benth. Most subg. *Oldenlandia* species average over 50 seeds per capsule, excepting *H. microtheca* (S. & C.) Steud. and *H. watsonii* W. H. Lewis from Mexico, with 20 and 30 seeds, respectively. The African *Oldenlandia* subg. *Orophilum* Brem. with 9 species and the questionable segregate *Lelya* Brem. are described as few-seeded (Bremekamp, 1952). These examples illustrate a continuous and often overlapping range for seed frequency in the two subgenera.

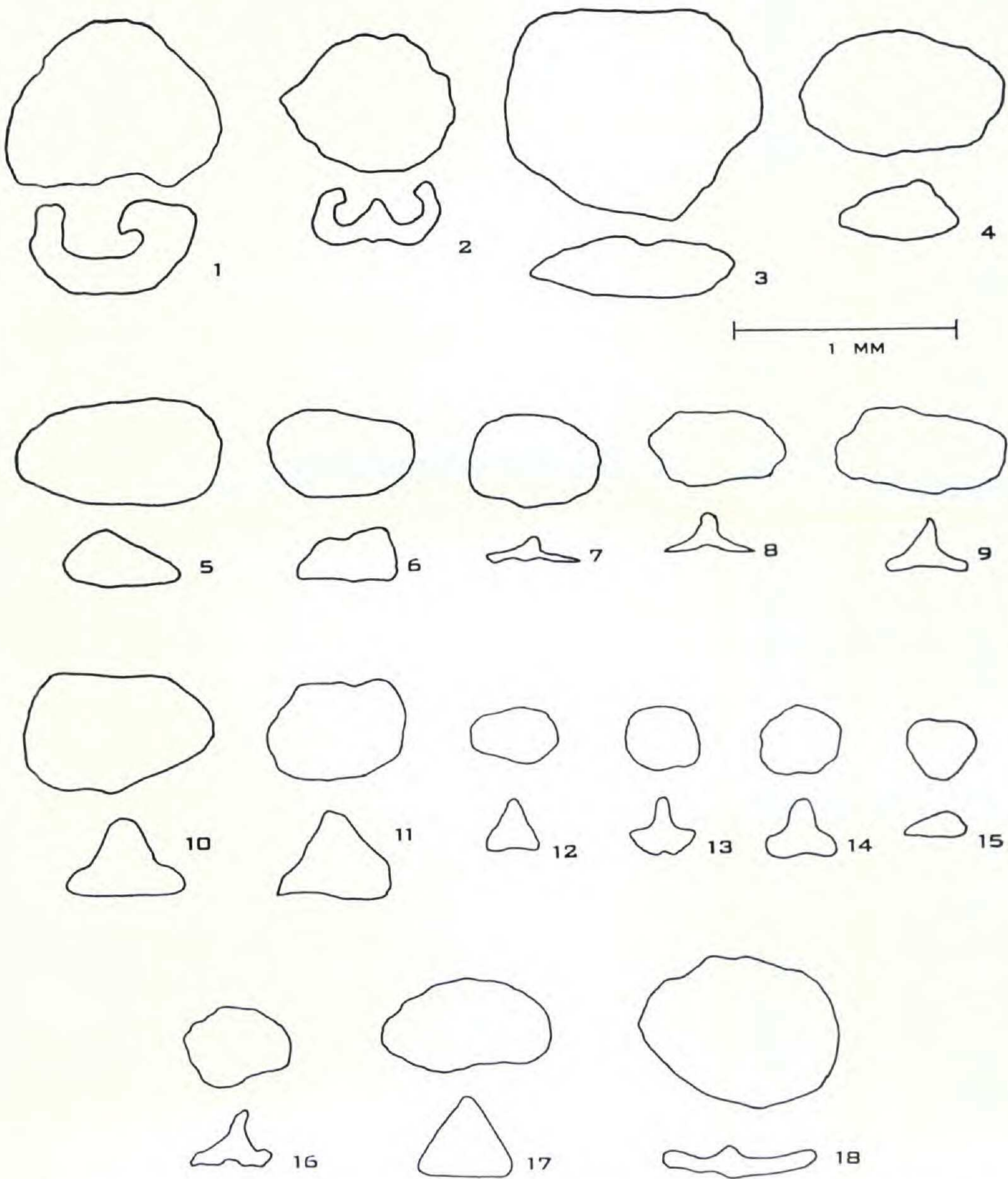
The typical seeds of 18 species of subg. *Houstonia* and subg. *Oldenlandia* are outlined in figures 1-18. The usual subg. *Oldenlandia* seed is small, e.g., *H. corymbosa* (L.) Lam. (fig. 12, 0.24 x 0.4 mm.), but this varies to the larger seeds of *H. greenei* (Gray) W. H. Lewis (fig. 17, 0.41 x 0.71 mm.) and *H. microtheca* (fig. 18, 0.65 x 0.90 mm.). These seeds are about the same size or even larger than those of *H.* (*Houstonia*) *asperuloides*, *H. saxatilis* W. H. Lewis, *H. peninsularis* (Brandg.) W. H. Lewis, *H. arenaria*, *H. gracilentata* (I. M. Johnst.) W. H. Lewis, *H. umbratilis* (Robins.) W. H.

<sup>2</sup>The North American *Houstonia* and *Oldenlandia* are discussed at the rank of subgenus so that the accepted nomenclature for *Hedyotis* can be used. Only one of the Afro-Asian species used in evidence here has been transferred to *Hedyotis*. Because a detailed study of the more numerous Old World species was not attempted, a change in nomenclature at this time is premature and all species and the subg. *Orophilum* Brem. are retained under *Oldenlandia*.

Lewis (fig. 6-11), and several additional species not illustrated. Although the seeds of subg. *Houstonia* tend to be larger than those of subg. *Oldenlandia*, a discontinuity in size does not exist.

The species of subg. *Houstonia* are described as having dorsiventrally flattened seeds with distinct craters varying to concavo-convex and with hilar ridges on the ventral face. Near median sections of *H. crassifolia* Raf. and *H. wrightii* (Gray) Fosb. seeds are typical representatives (fig. 1-2). Those of subg. *Oldenlandia* do not have seeds dorsiventrally flattened, craterformed, concavo-convex, nor ventrally ridged, but rather they are angular or more rarely subglobose (fig. 12-14). These descriptions, however, are not always applicable. The seeds of *H. (Houstonia) mullerae* Fosb. (fig. 4), *H. brevipes* (fig. 5), and *H. asperuloides* (fig. 6) are not strongly dorsiventrally flattened, but are  $\pm$  angular; those of *H. arenaria* (fig. 9), *H. gracilentata* (fig. 10), and *H. umbratilis* (fig. 11) are angular. None are craterform and all lack hilar ridges. An intermediate seed type with only a shallow ventral groove may be noted for *H. serpyllacea* Schl. (fig. 3). On the other hand, the  $\pm$  dorsiventrally flattened seeds of *H. (Oldenlandia) callitrichoides* (Griseb.) W. H. Lewis (fig. 15) and the concavo-convex seeds of *H. microtheca* (fig. 18) with hilar ridges hardly match the characteristics of the subg. *Oldenlandia*. Such variability is not restricted to the American species, for the African *O. divaricata* Engl., *O. benguillensis* Hiern, *O. luzuloides* Schum., and *O. micrantha* Chiov., all possess dorsiventrally flattened seeds.

It is unfortunate that, in the Rubiaceae, there are a number of characters in general use which, for practical taxonomic purposes, are difficult to utilize (Verdcourt, 1958). Among these I include the endosperm of small seeds. Most species of subg. *Houstonia* have corneous endosperms, but among the exceptions are *H. arenaria*, *H. saxatilis*, and *H. brevipes*, whose endosperms are decidedly fleshy. Those of *H. (Houstonia) gracilentata* and *H. (Oldenlandia) callitrichoides* are intermediate in texture, while the seeds of *H. mi-*



Figs. 1-18. Outlines and near median sections of *Hedyotis* seeds, Figs. 1-11 subg. *Houstonia*, Figs. 12-18 subg. *Oldenlandia*. Fig. 1. *H. crassifolia* Raf.; fig. 2. *H. wrightii* (Gray) Fosb.; fig. 3. *H. serpyllacea* Schl.; fig. 4. *H. mullerae* Fosb.; fig. 5. *H. brevipes* (Rose) W. H. Lewis; fig. 6. *H. asperuloides* Benth.; fig. 7. *H. saxatilis* W. H. Lewis; fig. 8. *H. peninsularis* (Brandg.) W. H. Lewis; fig. 9. *H. arenaria* (Rose) W. H. Lewis; fig. 10. *H. gracilentia* (I. M. Johnst.) W. H. Lewis; fig. 11. *H. umbratilis* (Robins.) W. H. Lewis; fig. 12. *H. corymbosa* (L.) Lam.; fig. 13. *H. pringlei* (Robins.) W. H. Lewis; fig. 14. *H. herbacea* L.; fig. 15. *H. callitrichoides* (Griseb.) W. H. Lewis; fig. 16. *H. watsonii* W. H. Lewis; fig. 17. *H. greenei* (Gray) W. H. Lewis; fig. 18. *H. microtheca* (Schl. & Cham.) Steud. Drawn with the aid of a camera lucida at  $\times 24$  reduced by one-half in reproduction.

*crotheca*, *H. watsonii*, and *H. pringlei* (Robins.) W. H. Lewis are corneous, contrary to the typification of subg. *Oldenlandia*. This feature is at best a generalization with fleshy, intermediate, and corneous endosperms known to each subgenus.

FRUIT. The eastern North American species of subg. *Houstonia* often have capsules one-half or frequently less than one-half inferior. From these first described species, the taxon was sharply separated from its closest relatives and even removed from the Rubiaceae (to the Gentianaceae, DC. Prodr.4: 622, 1830). The study of the southwestern species, in particular *H. arenaria*, *H. asperuloides*, *H. gracilentata*, *H. mucronata* Benth., *H. greenmanii* Fosb., *H. serpyllacea*, and *H. subviscosa* (Wright ex Gray) Shinnery, has shown that the subg. *Houstonia* capsules may be entirely or almost entirely inferior, i.e., not more than one-sixth free. Although the subg. *Oldenlandia* capsules are rarely free, the American *H. microtheca* and *H. watsonii* and the African *O. juncooides* Schum. and *O. staelioides* Schum. are not wholly inferior and are indistinguishable from those of the subg. *Houstonia* species mentioned.

FLOWER. At least one American species, *H. (Oldenlandia) pringlei*, is dimorphic, as are the flowers of *O. affinis* (R. & S.) DC., *O. umbellata* L., *O. verticillata* Bullock ex Brem., *O. somala* Chiov., and *O. eludens* Brem. from Afro-Asia. Perhaps a greater per cent of species in the subg. *Houstonia* possess this characteristic than is known for subg. *Oldenlandia*, but such a tendency has little taxonomic value.

Many Mexican and eastern North American species under subg. *Houstonia* have rather elongate corollas, while the two widely distributed species of subg. *Oldenlandia* in North America, *H. boscii* DC. and *H. uniflora* (L.) Lam., have insignificant, minute corollas. The corollas of *H. (Houstonia) australis* Lewis & Moore, *H. croftiae* (Britt. & Rusby) Shinnery, *H. intricata* Fosb., *H. greenmanii* Fosb., and *H. subviscosa*, however, rarely exceed 2 or 3 mm. in length and are about equal to those of the typical subg. *Oldenlandia* species. In contrast, *H. (Oldenlandia) pringlei* (5-8 mm.) and *H. xestosperma* (Robins. & Greenm.) W. H. Lewis (7-9 mm.)

from Mexico and *O. cryptocarpa* Chiov. (tube, 6 mm.), *O. hymenophylla* Brem. (tube, 7 mm.), and *O. sepaneooides* Schum. (tube, 7 mm.) from Africa have long corollas about equal to the longest in subg. *Houstonia*.

No character currently in use separates the *Houstonia* from the pantropical *Oldenlandia*, and at best only tendencies are expressed. In his revision of the African species, Bremekamp (1952) has chosen, usually with considerable hesitation, to establish genera for those species varying by one or more "key" characters. Although fewer taxa are indigenous to North America, at least 4 additional genera would be required to accommodate those species morphologically between the (artificial) limits established for typical *Houstonia* and the North American *Oldenlandia*. Since the major characteristics of several species exhibit continuous ranges, even this procedure would not place all taxa in definite niches, and for this reason alone, such a generic realignment would ultimately collapse.

On the basis of morphological and the supporting, though incomplete, cytological data (Lewis, 1959), the two genera are merged under *Hedyotis* following Torrey & Gray (1841), Fosberg (1941, 1954), and Shinnars (1949). Most taxa have been transferred to *Hedyotis*, but a number of new combinations must be made to complete this transfer for the North American species.

#### HEDYOTIS subgenus HOUSTONIA (L.) Gray

HEDYOTIS ARENARIA (Rose) W. H. Lewis, comb. nov., based on *Houstonia arenaria* Rose, Contr. U. S. Nat. Herb. 1: 70, 1890.

HEDYOTIS ASPERULOIDES Benth., f. BRANDEGEANA (Rose) W. H. Lewis, comb. nov., based on *Houstonia brandegeana* Rose, Contr. U. S. Nat. Herb. 1: 70, 1890. Distinguished from the typical form by its fine, delicate stems and slightly smaller (1-2 mm.) capsules which are  $\pm$  equal in width and length.

HEDYOTIS BREVIPES (Rose) W. H. Lewis, comb. nov., based on *Houstonia brevipes* Rose, Contr. U. S. Nat. Herb. 1: 83, 1890.

HEDYOTIS DRYMARIOIDES (Standl.) W. H. Lewis, comb. nov. based on *Houstonia drymarioides* Standl., Jour. Wash. Acad. Sci. 18: 162, 1928.

HEDYOTIS EXIGULA W. H. Lewis, nom. nov., based on *Houstonia gracilis* T. S. Brandg., Zoe 5: 238, 1907. Not *Hedyotis gracilis* DC., Prodr. 4: 419, 1830.

HEDYOTIS GRACILENTA (I. M. Johnst.) W. H. Lewis, comb. nov., based on *Houstonia gracilentata* I. M. Johnst., Proc. Calif. Acad. Sci. IV. 12: 1174, 1924.

HEDYOTIS LONGIPES (S. Wats.) W. H. Lewis, comb. nov., based on *Houstonia longipes* S. Wats., Proc. Amer. Acad. 18: 97, 1883.

HEDYOTIS NIGRICANS (Lam.) Fosberg, f. SALINA (Heller) W. H. Lewis, comb. nov., based on *Houstonia salina* Heller, Bot. Expl. S. Tex. (Contrib. Herb. Franklin & Marshall College 1) : 96, 1895.

HEDYOTIS PALMERI (Gray) W. H. Lewis, comb. nov., based on *Houstonia palmeri* Gray, Proc. Amer. Acad. 17: 202, 1882.

HEDYOTIS PENINSULARIS (T. S. Brandg.) W. H. Lewis, comb. nov., based on *Houstonia peninsularis* T. S. Brandg., Zoe 5: 160, 1903.

HEDYOTIS SAXATILIS W. H. Lewis, nom. nov., based on *Houstonia australis* I. M. Johnst., Univ. Calif. Publ. Bot. 7: 446, 1922. Not *Hedyotis australis* Lewis & Moore, Southwest. Nat. 3(1958) : 208, 1959.

HEDYOTIS SINALOAE W. H. Lewis, nom. nov., based on *Houstonia parvula* T. S. Brandg., Zoe 5: 221, 1905. Not *Hedyotis parvula* (Gray) Fosberg, Bull. Bishop Mus., Honolulu, no. 174: 54, 1943.

HEDYOTIS UMBRATILIS (Robins.) W. H. Lewis, comb. nov., based on *Houstonia umbratilis* Robins., Proc. Amer. Acad. 45: 401, 1910.

HEDYOTIS VEGRANDIS W. H. Lewis, nom. nov., based on *Houstonia prostrata* T. S. Brandg., Zoe 5: 105, 1901. Not *Hedyotis prostrata* Korth., Nederl. Kruidk. Arch. II. 2: 160, 1851.

#### HEDYOTIS subgenus OLDENLANDIA (L.) Fosberg

HEDYOTIS CALLITRICHOIDES (Griseb.) W. H. Lewis, comb. nov., based on *Oldenlandia callitrichoides* Griseb., Mem. Amer. Acad. II, 8: 506, 1863.

HEDYOTIS CAPILLIPES (Griseb.) W. H. Lewis, comb. nov., based on *Oldenlandia capillipes* Griseb., Cat. Pl. Cub. 130, 1866. Not *Hedyotis capillipes* Schl. ex Hook. f., Fl. Brit. Ind. 3: 73, 1880, pro syn.

HEDYOTIS GREENEI (Gray) W. H. Lewis, comb. nov., based on *Oldenlandia greenei* Gray, Proc. Amer. Acad. 19: 77, 1883.

HEDYOTIS PRINGLEI (Robins.) W. H. Lewis, comb. nov., based on *Oldenlandia pringlei* Robins., Proc. Amer. Acad. 27: 169, 1892.

HEDYOTIS WATSONII W. H. Lewis, nom. nov., based on *Oldenlandia ovata* S. Wats., Proc. Amer. Acad. 18: 97, 1883. Not *Hedyotis ovata* Thunb. ex Maxim., Bull. Acad. Petersb. 29: 161, 1883.

HEDYOTIS XESTOSPERMA (Robins. & Greenm.) W. H. Lewis, comb. nov., based on *Oldenlandia xestosperma* Robins. & Greenm., Proc. Amer. Acad. 32: 41, 1896. — DEPT. OF BIOLOGY, STEPHEN F. AUSTIN STATE COLLEGE, NACOGDOCHES, TEXAS.

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## DRABA APRICA IN OKLAHOMA

REED C. ROLLINS

It is often said among botanists that rare plants receive an unwarranted amount of attention and by and large this appears to be true. Some of the stimulus for this is to be associated with the attraction of novelty for its own sake but I am convinced that a real desire to make rarities more generally known or to clear up doubtful information is often basic to the attention given. A case in point as to the latter has to do with *Draba aprica* Beadle. This little annual crucifer was first discovered by Thomas Nuttall in Arkansas in 1819 and later published for Nuttall by Torrey and Gray (1838) as *Draba brachycarpa* Nutt.  $\beta$  *fastigiata* Nutt. The same plant was found on Kenesaw Mt., near Marietta, Georgia, and described for Beadle by Small (1913) as *D. aprica* without reference to the earlier varietal name of Nuttall.

When Fernald (1934) was working on *Draba* in the early 1930's, he stimulated L. M. Perry to search for this species on Kenesaw Mt., since it had not been recollected in the in-